Cheung, Wendy

From: pat obrien <pwob@comcast.net>
Sent: Tuesday, January 24, 2017 9:10 AM
To: Cheung, Wendy
Subject: RE: DI-2 well TDS in formation water

Will do.

POB

From: Cheung, Wendy [mailto:Cheung.Wendy@epa.gov]
Sent: Monday, January 23, 2017 5:01 PM
To: pat obrien
Subject: RE: DI-2 well TDS in formation water

Pat,

This is helpful. In addition to the data you've compiled, please also evaluate the water quality of these formations using the logs from DI-1. As I said previously, we need to build a strong case that these formations are not USDWs. Particularly since these wells you're using are miles away.

I'll get back to you tomorrow on the MAIP.

Wendy

From: pat obrien [mailto:pwob@comcast.net]
Sent: Monday, January 23, 2017 5:16 PM
To: Cheung, Wendy <Cheung.Wendy@epa.gov>
Cc: ''Scott Mefford'' <smefford@comcast.net>; 'Scott Niebur' <sniebur@eccv.org>; 'Rick Clark' <rclark@eccv.org>; 'Michelle Probasco' <mprobasco@eccv.org>; 'Clint Carter' <ccarter@eccv.org>; 'Chris Douglass' <cdouglass@eccv.org>
Subject: DI-2 well TDS in formation water

Wendy,

Good news. I researched the Colorado Oil and Gas Conservation Commission (COGCC) records for additional Total Dissolved Solids test data to show the formations between the Pierre Shale and the Lykins formations are not USDWAs (i.e. their TDS levels are greater than 10,000 mg/l.) My search was limited to Adams and Weld counties and I tried to keep the search grid within 30 miles of the DI-2 well site. Most of the data came from wells that are within 20 miles of DI-2. However, some of the Dakota group water samples were taken from wells about 40 miles from the DI-2 well. The DI-2 well is located in section 1, T1S, 66W.

As discussed in my last email, the formations of interest are the confining shale zones:

Pierre Shale
Niobrara
Greenhorn
Morrison

And the potential USDWAs, including:

Dakota Group
Entrada

I found four wells with water data in the Sussex Member of the Pierre Shale, but I found no water data in the Niobrara, Greenhorn, or Morrison. This is likely because these formations are composed mainly shale with a very low permeability.

I also was able to document six wells/TDS levels in the Dakota Group (in the D and J sands) and four wells/TDS levels in the Entrada Formation.

In summary, TDS levels in all 14 samples were well over 10,000 mg/l.

The Average TDS (mg/l) in the formations is as follows:

Pierre Shale	19,555
Dakota Group	13,559
Entrada	15,235

An XL file detailing the data is attached.

Based on this data, it is my opinion that the Alluvium, Arapahoe and Laramie-Fox Hills formations are the only USDWAs penetrated by the DI-2 well and that the well is cemented properly to protect said aquifers (see cement bond long interpretation letter previously sent) and further work, including log analysis or tracer surveys are not needed.

Please let me know if you have any comments or questions.

Sincerely,

Pat OBrien